



State of Utah

Department of
Environmental Quality

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CC: Paul
M370088

April 23, 2007

Mr. Lantz M. Indergard, P.G.
Environmental Manager
Lisbon Valley Mining Company
P.O. Box 248
920 S. County Road 313
La Sal, Utah 84530

RECEIVED
APR 25 2007
DIV. OF OIL, GAS & MINING

Dear Mr. Indergard:

Subject: Lisbon Valley Stage 3 and 4 Heap Leach Design Report:
DWQ Comments and Request for Information

On March 21, 2007, the Division of Water Quality (DWQ) received the Design Report for Lisbon Valley Mine Stage 3 and 4 Heap Leach Facility (HLF) Expansion, which was prepared by Golder Associates Inc. In the introductory section of the design report, it is stated that the Stage 3 and 4 Design has generally been developed to be consistent with the Stage 1 and 2 Design with the exception of four proposed modifications. These modifications were discussed in a September 11, 2006 meeting at DWQ with you and your engineering consultant Brent Bronson. The proposed design modifications are provided below in italics followed by DWQ comments.

1. *The geomembrane incorporated in the Stage 3 and 4 liner system beneath the HLF will be [60-mil] linear low density polyethylene (LLDPE) instead of [80-mil] high density polyethylene (HDPE) that was used in Stages 1 and 2.*

DWQ Comments

The technical justification provided for this proposed modification is the superior flexibility, favorable biaxial stress strain properties, relatively higher interface shear strength, and proven ability for LLDPE to perform under high normal loads. In addition, high stress liner load testing and interface shear testing were conducted at Golder's geotechnical laboratories to evaluate the stability and survivability of the LLDPE liner material under anticipated loading conditions. Based on a comparison of the technical specifications of LLDPE versus HDPE, and the favorable geotechnical test results, this design modification is acceptable and the modification request is approved.

Because of its superior UV resistance, HDPE will still be used for the exposed collection channel and pond applications as in Stages 1 and 2.

2. *The "protective cover" secondary liner flap that was specified in the Stage 1 and 2 design along the perimeter of the HLF between the toe of the ore heap and the perimeter berm has been removed due to potential stability concerns. In lieu of this secondary liner flap, a sacrificial liner will be placed under all piping larger than 8 inches in diameter and a protective layer of Overliner Fill will be placed over the geomembrane at the perimeter of the HLF.*

DWQ Comments

We concur that the Stage 1 and 2 outer perimeter pad liner design has the potential for a liner on liner slope slip plane problem using the 60-mil LLDPE smooth geomembrane. As shown in Engineering Drawing 5, Leach Pad Details, this will be addressed by placing a sacrificial 80-mil HDPE rub sheet beneath all 8-inch diameter or greater solution piping, and a protective layer of overliner fill over the geomembrane at the perimeter of the HLF. Based on our review, we find this an acceptable solution and this proposed modification is approved.

3. *Due to the homogeneity of the subgrade soils beneath the HLF and the high quality of the data obtained from the settlement sensors installed beneath Stage 1, the data from Stage 1 monitoring sensors were used to calibrate the settlement model to support the design of Stages 3 and 4.*

DWQ Comments

The technical justification for this proposal is based on a settlement evaluation provided in Appendix E of the Stage 3 and 4 design report. A key assumption for this modification is that the leach pad subgrade soils are homogeneous aeolian deposits. Based on a review of boring logs in the Stage 1 design report (J.D. Welsh and Associates, 1996), the subgrade lithology profile is homogeneous from a textural standpoint and is comprised of very fine to fine-grained sediments. Boring logs LP-2 through LP-6 characterize the subgrade profile as silty clays, silty sands, silts, and clayey to silty fine-grained sands. This is consistent with the Stage 1 design report, which describes the near surface foundation materials as loose sands intermixed with silts and clays (J.D. Welsh and Associates, Appendix E, 1996). This fine-grained heterogeneity was acknowledged in the discussion section of the evaluation as a possible explanation for differences between settlement values for various sensors. Nevertheless, the evaluation did show that the measured heap leach displacements are within the bounds of the calculated settlements, and the foundation settlements predicted under the maximum ore height of 108 feet are expected to range from 0.6 to 1.2 feet. During the September 11, 2006 meeting at DWQ, Brent Bronson of Golder discussed additional technical justifications to support this modification, which was not included in the design report. This included a higher stability safety factor provided by using an LLDPE versus HDPE geomembrane, and the fact that the load is uniform and not differential, which renders a very low rupture potential. In addition, the leach pad expansion is occurring westward in the upslope direction of the valley. As a result, the subgrade interval of unconsolidated alluvial material decreases westward, which reduces settlement potential. Based on this information and the settlement evaluation in the design report, this modification request is approved.

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4. *Given the significant depth to ground water at the site, an unsaturated zone monitoring system will be used for Stages 3 and 4 rather than the HLF leak detection system incorporated in Stages 1 and 2.*

DWQ Comments

We agree that a vadose zone monitoring system is appropriate for the leach pad given the significant depth to ground water at the site. However, based on the 25-foot vertical placement of the lysimeter probes beneath the leach pad, and the 900-foot horizontal spacing between the lysimeter probes, we do not have confidence in the efficiency of the proposed system for leak detection. Please provide modifications to the proposed vadose zone monitoring system so that it can serve as an adequate leak detection system or provide an alternative leak detection system for review.

If you have any questions about this letter, please contact Woodrow Campbell at wwcampbell@utah.gov or (801) 538-6067.

Sincerely,



Rob Herbert, P.G., Manager
Ground Water Protection Section

cc: Brent Bronson, Golder Associates Inc.
Dave Ariotti, SE District Engineer
Susan White, DOGM

RFH/WWC:mr

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